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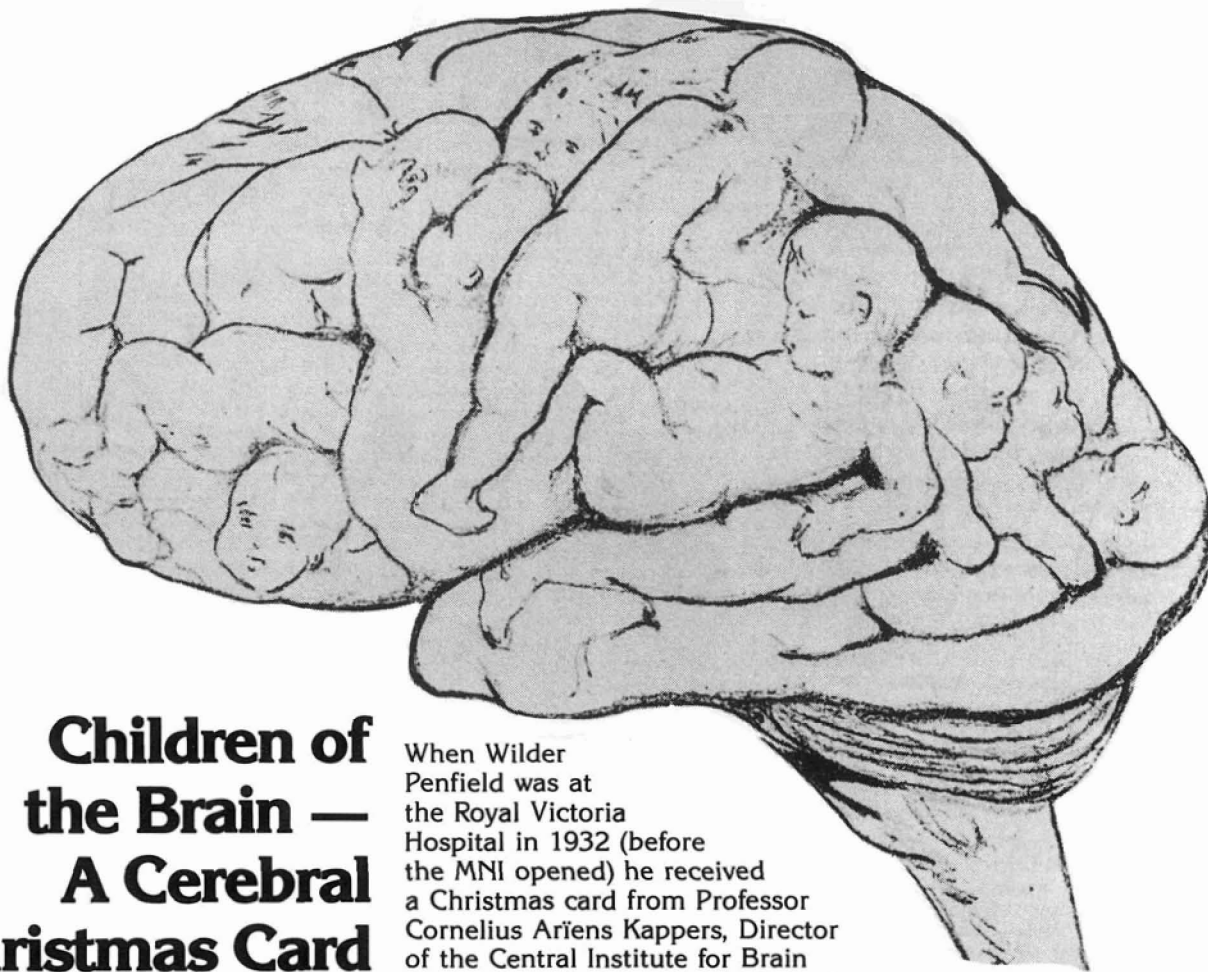


HÔPITAL NEUROLOGIQUE DE MONTRÉAL
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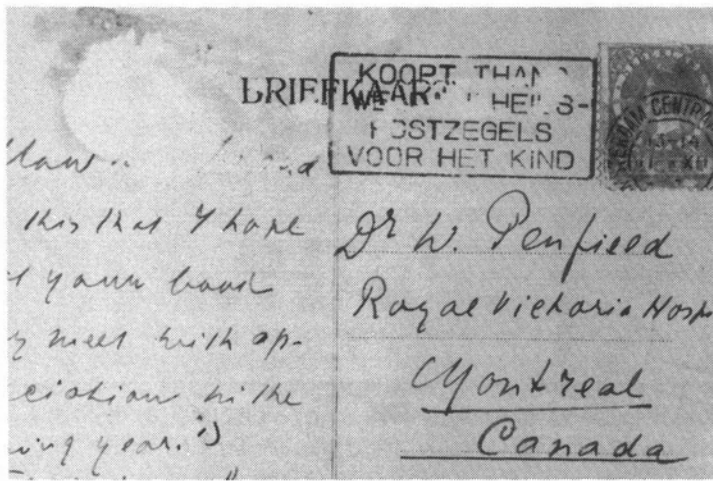
Happy Christmas and a prosperous New Year.



Children of the Brain — A Cerebral Christmas Card

WILLIAM FEINDEL¹, OC, MDCM, FRCSC

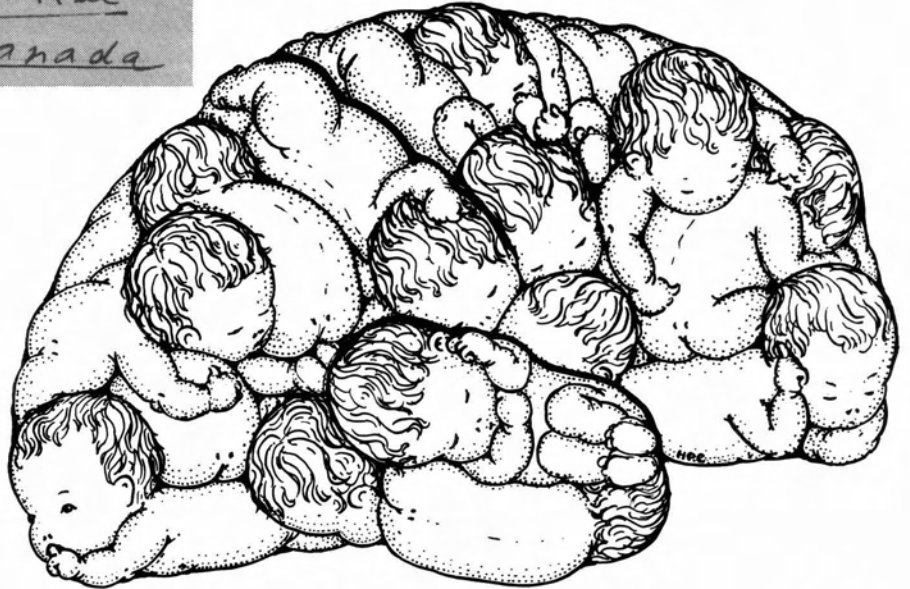
When Wilder Penfield was at the Royal Victoria Hospital in 1932 (before the MNI opened) he received a Christmas card from Professor Cornelius Ariens Kappers, Director of the Central Institute for Brain Research in Amsterdam. It showed the left side of the brain, cerebellum



Cover — Postcard from Professor Ariens Kappers to Dr. Penfield depicting the convolutions of the brain babies.

Figure 2 — Back of the card with the Nederland stamp and the message from Professor Kappers.

and brainstem, with the convolutions drawn as infants in various postures (Figure 1), but not corresponding closely to functional areas of the cortex. For example, one child cupping the ear of another appears in the mid-frontal region, rather than the auditory area. Bodies in the sensory-motor strip do not match the well known "upside down" localization, though one child does appear to be gazing from the occipital area to indicate visual function. On the back of the card, the professor's message had been cropped by Dr. Penfield to fit a frame (Figure 2).



*Where shall wisdom be found and
Where is the place of understanding?*

Intrigued with the drawing, Dr. Penfield commissioned Hortense Douglas Cantlie, an artist who skillfully drew his surgical illustrations, to elaborate on the brain babies². In the MNI version their anatomical poses relate more closely to functions localized in the human cerebral cortex, as mapped by electrical stimulation at operation (Figure 3). In the sensory-motor area, the face and head are now properly at the lower end near the Sylvian fissure, with the rest of the body above. Vision is again represented by an infant staring out from the occipital pole. The infant cupping a hand about the ear now lies in the correct location of the auditory cortex. In the frontal pole, a child pensively tips the index finger to temple as though staining a thought. It is puzzling that Dr. Penfield, despite his deep interest in speech mechanisms, did not ask the artist to keep the dominant hemisphere as on the original card — so no infants denote the speech areas. Dr. Penfield subscribed his favorite quote from the book of Job,



Figure 3 — Version of the brain children drawn by Hortense Douglas Cantlie with the quote in Dr. Penfield's hand.

Figure 4 — Sculpting of the brain children prepared under the direction of Galt Durnford, architect, for the McConnell Pavilion in 1953.

Craniopharyngioma with unusual extension to cerebello-pontine angle

Samer Ghafir, m.d.

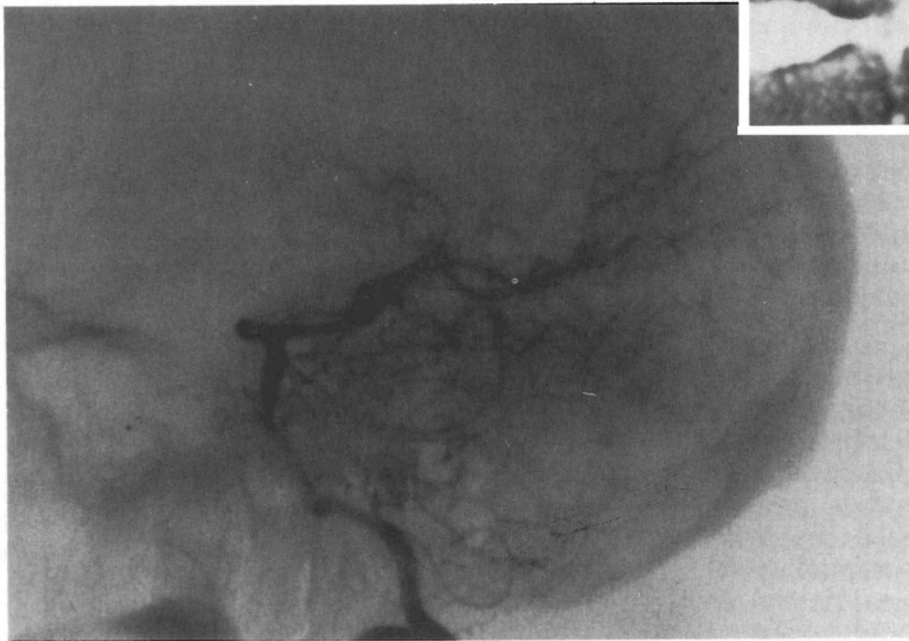


Fig. 1

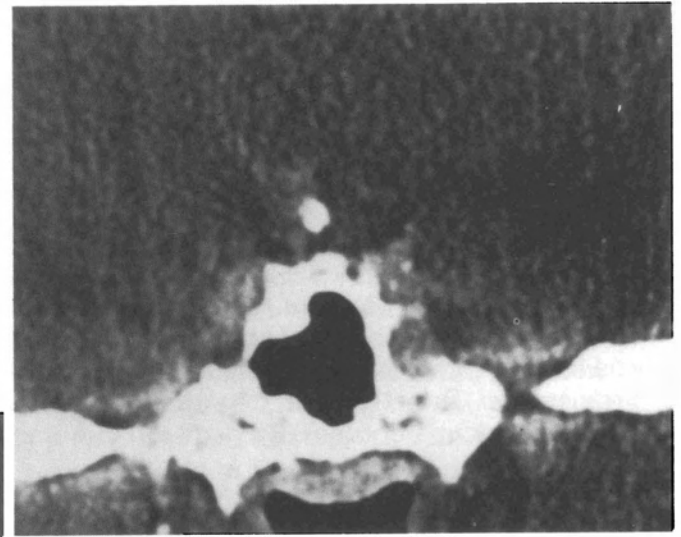


Fig. 3

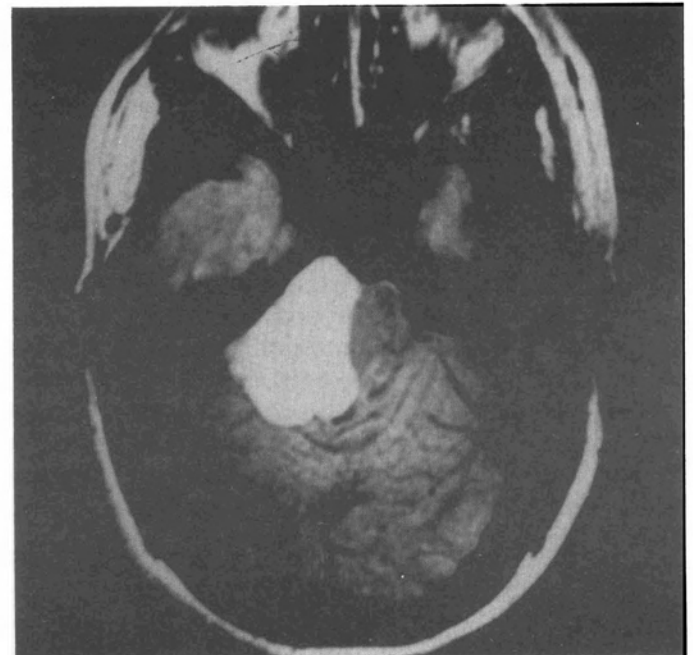


Fig. 2

37 years old female with a history of headache, dizziness, intermittent blurred vision, occasional scotomas, increased appetite and polyuria, increased somnolence and decreased libido, numbness in right side of face and tongue.

Computed Tomography showed an enhancing suprasellar mass, but overlooked evidence of right cerebello-pontine angle lesion (Fig. 1). Patient underwent stereotaxic biopsy and aspiration of a cystic craniopharyngioma. Patient was readmitted one month after discharge, for worsening of headache and vision. Magnetic Resonance showed a high intensity lesion extending from suprasellar region to the right cerebello-pontine cistern (Fig. 2). Vertebral arteriography confirmed the direction of extension by the downward displacement of the right superior cerebellar artery (Fig. 3). Patient was reoperated and the diagnostic of craniopharyngioma confirmed.

La discographie lombaire

Denis Melanson, m.d.

C'est en 1966, avec le Dr Donald McRae, que j'ai commencé à utiliser la technique de la discographie lombaire. De son enseignement j'ai retenu entre autres qu'il y avait avantage à démontrer la dégénérescence du disque, la fissure, l'extravasation épidurale et que la douleur reproduite signifiait quelque chose.

Par la suite, le Dr Gilles Bertrand a été celui qui m'a le plus aguerri à cette technique. Il attendait de l'examen deux choses: 1) nettement positif: disque fissuré, extravasation, douleur exquise, intense, progressive; 2) nettement négatif: morphologie normale, aucune douleur. Sa décision clinique en découlait.

J'ai appris au fil des années que la réponse négative était aussi importante que la réponse positive. Et j'ai persisté. Et j'ai enseigné la même technique que celle apprise, à tous ceux qui voulaient la recevoir. P.C. Millette fut de ceux-là. Après quelques années, nous avons mis en commun notre expérience. Plusieurs se sont intéressés aux conclusions de ce travail (1).

Le scanner a, sans contredit, complété la myélographie et diminué le recours à la discographie. Et il s'est révélé plus efficace dans les protrusions postéro-latérales en L4-L5 et L5-S1. Quant à l'injection du disque dégénéré, le produit miracle demeure toujours à trouver, le danger du présent produit éloignant bien des adeptes potentiels. Mais l'intervention demeure valable. Et maintenant, la résonance magnétique et son potentiel! Le disque est visible: la phase myélographique du spin echo permet de voir sa protrusion et combien le tube dural et sa racine en sont affectés. Mais est-ce que cette exhibition de la morphologie permet de bien apprécier le contenu discal et son comportement en hyperpression? Je crois qu'il faut dire NON!

Le traitement de la lombalgie et de la sciatgie échappe encore à la profession médicale. Bien peu de cliniciens peuvent se vanter d'avoir réussi à plus de 50 %. Le problème est complexe, ses approches aussi. Je crois que les hydrosolubles, la scannographie et la résonance n'ont pas éliminé la nécessité, parfois, mais plus rarement qu'avant, d'apprécier la dégénérescence du disque lombaire, et d'être plus logique à le dire sain ou malade, et parfois d'intervenir directement pour réduire ou éliminer la morbidité qu'il cause.

Je m'inscris donc en faux contre les opinions récentes à l'effet que cette technique est devenue entièrement désuète (2).



CT Discography: normal



1. MILLETTE PC, MELANSON D. A reappraisal of lumbar discography. *Journal de l'Association Canadienne des Radiologistes*, 1982; 33: 176-182.

Lumbar discography

Denis Melanson, m.d.



CT Discography: posterior rupture



I was initiated into lumbar discography in 1966, by Dr Donald McRae. From him I learned that this technique had the advantage of demonstrating the degeneration of a disc, its fissure, and the epidural extravasation of contrast. Moreover, it had the added advantage of reproducing the patient's pain.

In the years that followed, Dr Gilles Bertrand encouraged me to use this technique. In his opinion, it was to be expected that the examination would be either, 1) clearly positive, with a fissured disc, extravasation, and exquisite pain which simulated the patient's own, or, 2) clearly negative, with normal morphology and absence of pain. He relied on the above criteria in making his clinical decision.

Through the years, I learned that a negative answer is just as important as a positive one. I persisted. I taught this technique to those who cared to learn. P.C. Milette was one of them. We have shared our experience after a number of years. Many have shown interest in our work (1).

Today, unquestionably, CT scanning has complemented myelography and has decreased the need for discography. It has proven more effective in L4-L5 and L5-S1 postero-lateral protrusions. With regard to the degenerated disc injection, the miracle product has yet to be found, since the risk of the current product discourages many. However, the intervention remains valuable. And now, magnetic resonance and its potentiality! The disc is visible: the myelographic phase of the spin echo allows visualization of its protrusion as well as the extent to which the dural tube and the roots are affected. However, does this demonstration of the morphology enable us to appreciate the disc content and its reaction to hyperpressure? I think the answer is NO!

Treatment of lumbalgia and sciatalgia still escapes the medical profession. Very few clinicians can claim success in more than 50 % of their cases. The problem as well as the approaches is complex. In my opinion, hydrosoluble contrasts, scannography and resonance have not eliminated the necessity, at times, but less frequently, of doing discography. Lumbar discography can still demonstrate lumbar disc degeneration, and just as important, whether the disc is in fact healthy. It helps us make up our mind whether or not to intervene, and thus reduces morbidity.

I disagree entirely with recent opinions stating that this technique has no longer any role as a pre-operative diagnostic procedure (2).

2. SHAPIRO, R. Current Status of Lumbar Discography. **Radiology**, 1986, 159(3): 815.

Horizontal fracture of the anterior arch of the atlas

S. Fontaine, m.d.

A 28 year-old woman presented severe neck pain after a motor vehicle accident. The neurological examination was normal. The lateral radiograph of the cervical spine showed a horizontal fracture of the anterior arch of the atlas (Fig. 1). There was no dens fracture. The frontal tomogram showed a fracture of the lateral mass of the atlas on the right side (Fig. 2).

cervical spine, especially dens fracture or avulsions of the antero-inferior margin of the axis body.

The mechanism of injury suggested is that the anterior tubercle of the atlas may be avulsed by forces applied by the anterior longitudinal ligament and the defensive contraction of the longus colli muscles.

In the Duke series, horizontal fracture of the anterior arch of the atlas accounted for 2 per cent of cervical fractures. Those fractures are usually associated with other hyper extension fractures of the

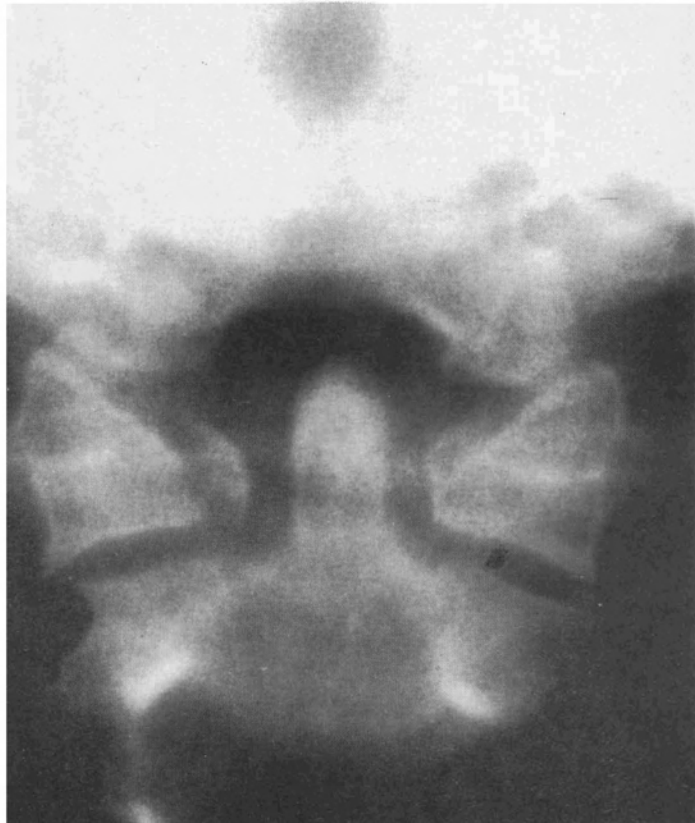
Reference

Gehweiler JA, Duff DE, Martinez S, Miller MD, and Clark WM. Fractures of the atlas vertebra. *Skeletal Radiol.* 1:97, 1976.

Fig. 1



Fig. 2



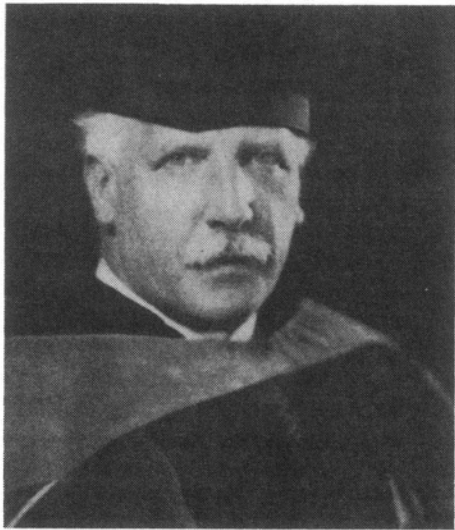


Figure 5 — Professor Ludwig Edinger (1855-1918), Director of the Neurological Institute in Frankfurt — am — Main, in whose laboratory the brain babies were born.

xxviii, "Where shall wisdom be found and where is the place of understanding?". This appears under the relief model of the drawing prepared in 1953 by the architect, Galt Durnford, for the plaque of the J.W. McConnell Wing. A copy of the sculpting hangs outside the Directors' office on the 6th floor of the Institute (Figure 4).

The story of the card might end there, except that Dr. Tilly Edinger, daughter of Professor Ludwig Edinger (1815-1918), Director of the Neurological Institute of the University of Frankfurt, inquired of Dr. Penfield where his card came from. She knew her father had used it to send greetings from his laboratory. Dr. Penfield's friend, Stanley Cobb, the Harvard neurologist, who shared Edinger's enthusiasm for the anatomy of the avian brain, attributed the drawing to R. Gudden³, a colleague of Edinger. However, Edinger, a fine artist himself, may have been responsible for it (Figure 5): F.H. Lewey relates that he would delight his students by sketching a brain structure with his left hand while writing the legend with his right (1). His daughter describes that when Edinger was having his portrait done while dissecting a brain, he noted the artist was having trouble with the convolutions of the brain, so he came to the canvas and painted them himself. Familiar to all stu-

dents of neurology is the Edinger-Westphal nucleus of the oculomotor nerve.

Professor Ariens Kappers had studied under Edinger as chief of his laboratory in 1906, and could have learned then of the brain babies. Ariens Kappers became recognized internationally as an authority in comparative neuro-anatomy, on which subject he wrote a two-volume treatise, co-authored in the English edition with G. Carl Huber and Elisabeth Crosby (Figure 6). He is best known for his theory of neurobiotaxis, which explained the embryonic migration of central neurons, especially in the cranial nerves, in response to incoming messages from the periphery (2).

The notion of children of the brain dates back at least to Shakespeare who refers to them in one of his sonnets, with the further suggestion that a memorandum is an assurance against what we would consider today as evidence for a hippocampal lapse.

*Look, what thy memory
cannot contain
Commit to these waste blanks,
and thou shalt find
Those children nursed, delivered
from thy brain
To take a new acquaintance
of thy mind.*

Or, in an aptly seasonable allusion, Mercutio speaks to Romeo (Act I, scene iv),

*True, I talk of dreams,
Which are the children of
an idle brain,
Begot of nothing but vain fantasy;
Which is as thin of substance
as the air,
And more inconstant than
the wind who woos
E'en now the frozen bosom
of the north.*

The Neurological Institute in Frankfurt was founded and financed by Edinger; in 1914 it became part of the Goethe University. The Central Institute for Brain Research in Amsterdam was founded in 1908, in part for Ariens Kappers, by the Royal Dutch Academy of Science; it was patterned after the Edinger Insti-

tute. The Montreal Neurological Institute, the "brain child" of Wilder Penfield, opened in 1934, with resources not only for research and teaching but as a specialized hospital, "dedicated to relief of sickness and pain and to the study of neurology".

So, to all Neuro-Imagers — from the Brain Babies and the Founders of three brain institutes, that have been synapsed by this cerebral card — **Happy Christmas and a prosperous New Year.**

Copyright, William Feindel
From the Brain Imaging Centre



Figure 6 — Professor Ariens Kappers (1877-1946), the distinguished comparative neuroanatomist, taken when he was honored by a degree from Yale University.

NOTES:

- 1- William Vernon Cone Professor of Neurosurgery Curator of the Penfield Archive, Osler Library McGill University
- 2- They recall the plump-checked putti of Donatello's Cantoria in the Duomo and the della Robbia medallions at the Ospedale degli Innocenti, Firenze
- 3- It is uncertain whether he was related to Bernard von Gudden (1824-1886), the distinguished neuropsychiatrist; unwisely, he took a walk with his patient, the mad King Ludwig II of Bavaria, who drowned his physician and then himself.

REFERENCES:

1. Lewey, F.H. Ludwig Edinger (1855-1918) pp. 111-116 in Haymaker, W. and Schiller F. (Eds.) **The Founders of Neurology**, 2nd Ed., 1970. Charles C. Thomas, Springfield, Ill.
2. Rioch, David McK., Cornelius Ariens Kappers (1877-1946) pp. 128-131, *ibid*

Chicago — RSNA 87

The last meeting of the RSNA in Chicago has confirmed the exceptional diagnostic value of magnetic resonance imaging in neurological disorders.

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This present issue of Neuro Image is sent as a Christmas card to extend to you our best wishes for the New Year.

Dr. Feindel, our neurosurgeon colleague, has drawn up his collection of Dr. Penfield's life, the story and images that you are now going to read and see.

We hope you enjoy it and remain our faithful reader for 1988.



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Les collègues et amis qui ont connu Donald L. McRae peuvent en faisant un don, témoigner de leur reconnaissance pour son influence et son enseignement dans le domaine de la Neuroradiologie.

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